

WE CLAIM:

SUB  
A B  
C D

1. A method to inhibit expression of a target gene in a cell comprising introduction of a ribonucleic acid (RNA) into the cell in an amount sufficient to inhibit expression of the target gene, wherein the RNA comprises a double-stranded structure with an identical nucleotide sequence as compared to a portion of the target gene.

2. The method of claim 1 in which the target gene is a cellular gene.

3. The method of claim 1 in which the target gene is an endogenous gene.

4. The method of claim 1 in which the target gene is a transgene.

5. The method of claim 1 in which the target gene is a viral gene.

6. The method of claim 1 in which the cell is from an animal.

7. The method of claim 1 in which the cell is from a plant.

8. The method of claim 6 in which the cell is from an invertebrate animal.

9. The method of claim 8 in which the cell is from a nematode.

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C2

10. The method of claim 1 in which the identical nucleotide sequence is at least 50 bases in length.

11. The method of claim 1 in which the target gene expression is inhibited by at least 10%.

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12. The method of claim 1 in which the cell is present in an organism and inhibition of target gene expression demonstrates a loss of function phenotype.

13. The method of claim 1 in which the RNA comprises one strand which is self-complementary.

14. The method of claim 1 in which the RNA comprises two separate complementary strands.

15. The method of claim 14 further comprising synthesis of the two complementary strands and initiation of RNA duplex formation outside the cell.

16. The method of claim 14 further comprising synthesis of the two complementary strands and initiation of RNA duplex formation inside the cell.

17. The method of claim 1 in which the cell is present in an organism, and the RNA is introduced within a body cavity of the organism and outside the cell.

18. The method of claim 1 in which the cell is present in an organism and the RNA is introduced by extracellular injection into the organism.

19. The method of claim 1 in which the cell is present in a first organism, and the RNA is introduced to the first organism by feeding a second, RNA-containing organism to the first organism.

20. The method of claim 19 in which the second organism is engineered to produce an RNA duplex.

21. The method of claim 1 in which an expression construct in the cell produces the RNA.

22. A method to inhibit expression of a target gene comprising:  
(a) providing an organism containing a target cell, wherein the target cell contains the target gene and the target gene is expressed in the target cell;

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CONT. →
- (b) contacting a ribonucleic acid (RNA) with the organism, wherein the RNA is comprised of a double-stranded structure with duplexed ribonucleic acid strands and one of the strands is able to duplex with a portion of the target gene; and
  - (c) introducing the RNA into the target cell, thereby inhibiting expression of the target gene.

~~23. The method of claim 22 in which the organism is an animal.~~

~~24. The method of claim 22 in which the organism is a plant.~~

~~25. The method of claim 22 in which the organism is an invertebrate animal.~~

~~13~~  
~~26. The method of claim 22 in which the organism is a nematode.~~

~~14~~  
~~27. The method of claim 26 in which a formulation comprised of the RNA is applied on or adjacent to a plant, and disease associated with nematode infection of the plant is thereby reduced.~~

SUB B47  
~~28. The method of claim 22 in which the identical nucleotide sequence is at least 50 nucleotides in length.~~

~~16~~  
~~29. The method of claim 22 in which the expression of the target gene is inhibited by at least 10%.~~

~~17~~  
~~30. The method of claim 22 in which the RNA is introduced within a body cavity of the organism and outside the target cell.~~

~~18~~  
~~31. The method of claim 22 in which the RNA is introduced by extracellular injection into the organism.~~

32. The method of claim 22 in which the organism is contacted with the RNA by feeding the organism food containing the RNA.

SUB B5  
33. The method of claim 32 in which a genetically-engineered host transcribing the RNA comprises the food.

<sup>21</sup>  
~~34.~~ The method of claim <sup>22</sup>~~22~~ in which at least one strand of the RNA is produced by transcription of an expression construct.

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SUB B6  
35. The method of claim <sup>22</sup>~~35~~ in which the organism is a nematode and the expression construct is contained in a plant, and disease associated with nematode infection of the plant is thereby reduced.

36. A cell containing an expression construct, wherein the expression construct transcribes at least one ribonucleic acid (RNA) and the RNA forms a double-stranded structure with duplexed strands of ribonucleic acid, whereby said cell contains the double-stranded RNA structure and is able to inhibit expression of a target gene when the RNA is contacted with an organism containing the target gene.

37. A transgenic animal containing said cell of claim 36.

38. A transgenic plant containing said cell of claim 36.

SUB A3  
39. A kit comprising reagents for inhibiting expression of a target gene in a cell, wherein said kit comprises a means for introduction of a ribonucleic acid (RNA) into the cell in an amount sufficient to inhibit expression of the target gene, and wherein the RNA has a double-stranded structure with an identical nucleotide sequence as compared to a portion of the target gene.

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